



U.S. Department
of Transportation
Federal Railroad
Administration

Locomotive Crashworthiness and Cab Working Conditions

Report to Congress

Office of Safety Assurance and Compliance

September 1996

EXHIBIT

6

tabbles



THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

September 18, 1996

The Honorable Albert Gore, Jr.
President of the Senate
Washington, D.C. 20515

Dear Mr. President:

I am pleased to submit the enclosed report prepared by the Federal Railroad Administration (FRA) on "Locomotive Crashworthiness and Cab Working Conditions," as requested by the Rail Safety Enforcement and Review Act, Public Law 102-365. This report responds to the congressional mandate to report on issues related to:

- health and safety of locomotive cab working conditions;
- effectiveness of Association of American Railroads (AAR) Specification S-580; and
- benefits and cost of additional locomotive crashworthiness features.

The report summarizes the findings of FRA's study, which included research on locomotive crashworthiness features, extensive consultations with a wide range of interested parties; and a field survey of actual locomotive working conditions. These findings indicate that a number of the crashworthiness features and working condition improvements identified in the Act merit further action by FRA in cooperation with the private sector. Identified priority safety improvements include implementation of stronger collision posts and full height corner posts, incorporation of a crash refuge, improved fuel tank design, and improved methods to control noise and temperature levels inside the locomotive cab.

Consistent with FRA's emphasis on promoting a collaborative approach to railroad safety, FRA will seek the participation of railroads, employee representatives, manufacturers and suppliers, and other interested persons in determining the specific actions that may be appropriate to advance the safety and health of railroad crew members, based on the results of this study and other information that the parties may make available. FRA expects to refer locomotive crashworthiness issues to the newly constructed Railroad Safety Advisory Committee. That committee will make recommendations on the best course of action to implement the recommendations of this report, including voluntary initiatives, and regulatory standards where appropriate.



THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

September 18, 1996

The Honorable Newt Gingrich
Speaker of the House of Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

I am pleased to submit the enclosed report prepared by the Federal Railroad Administration (FRA) on "Locomotive Crashworthiness and Cab Working Conditions," as requested by the Rail Safety Enforcement and Review Act, Public Law 102-365. This report responds to the congressional mandate to report on issues related to:

- health and safety of locomotive cab working conditions;
- effectiveness of Association of American Railroads (AAR) Specification S-580; and
- benefits and cost of additional locomotive crashworthiness features.

The report summarizes the findings of FRA's study, which included research on locomotive crashworthiness features, extensive consultations with a wide range of interested parties, and a field survey of actual locomotive working conditions. These findings indicate that a number of the crashworthiness features and working condition improvements identified in the Act merit further action by FRA in cooperation with the private sector. Identified priority safety improvements include implementation of stronger collision posts and full height corner posts, incorporation of a crash refuge, improved fuel tank design, and improved methods to control noise and temperature levels inside the locomotive cab.

Consistent with FRA's emphasis on promoting a collaborative approach to railroad safety, FRA will seek the participation of railroads, employee representatives, manufacturers and suppliers, and other interested persons in determining the specific actions that may be appropriate to advance the safety and health of railroad crew members, based on the results of this study and other information that the parties may make available. FRA expects to refer locomotive crashworthiness issues to the newly constructed Railroad Safety Advisory Committee. That committee will make recommendations on the best course of action to implement the recommendations of this report, including voluntary initiatives, and regulatory standards where appropriate.

- o conduct vibration measurements and studies¹⁰;
- o determine whether vibration may physiologically and/or psychologically harm the locomotive crew over an extended period of time;
- o evaluate whether new cab designs successfully address reduced vibration levels in locomotive cabs; and
- o develop applicable vibration guidelines.

Asbestos

Review of Existing Asbestos Research and Literature¹¹

Asbestos is a filamentous mineral useful because of its resistance to heat. Its primary use earlier in this century was as an insulating material, but in more recent years it has found widespread use in a number of other industries.

When asbestos is inhaled and deposited in the alveoli¹², it is ingested by macrophages¹³, and via mechanisms that are not currently clear, lead to the development of diffuse lung damage and the formation of fibrosis. Asbestos can lead to the development of a malignant tumor of the lining of the chest cavity and lung surface called mesothelioma, and, in association with cigarette smoking, can lead to an increased incidence of bronchogenic carcinoma.

The diagnosis of asbestosis depends upon a well-documented history of exposure, an accurate estimate of the degree of exposure, and a characteristic clinical picture. The patterns of impairment seen with asbestos exposure usually take 20 to 40 years to develop. There is evidence that lower exposure can lead to the development of mesothelioma. Individuals who develop moderate to severe degrees of asbestosis have a poor prognosis, and those who

¹⁰ Measurements of operational vibrations on all three axes, including those in the 1 to 10 Hz range, are needed to determine actual vibration conditions in the cab. Once these levels are known, the need and potential benefit of more extensive—and expensive—control can be determined.

¹¹ Industrial Toxicology: Safety and Health Applications in the Workplace; Edited by Phillip L. Williams & James L. Burson, 1985

¹² Alveoli is an air sac of the lungs at the termination of a bronchiole.

¹³ Macrophage is a large phagocytic cell of the reticuloendothelial system.

develop malignant mesothelioma have an exceedingly poor outlook in that mesothelioma cannot be removed surgically, nor is it amenable to irradiation therapy or chemotherapy. The outlook for those individuals who develop associated bronchogenic carcinoma is the same for those who develop lung cancer and who have not been exposed to asbestos—that is, the 5-year survival rate is about 5 to 10 percent.

The long-term health consequences of this exposure are unknown. It is highly unlikely that this small degree of exposure could lead to the development of the interstitial fibrotic pattern of impairment, but there is a possibility that such exposure could lead to an increased incidence of mesothelioma and, in smokers, to an increased incidence of bronchogenic carcinoma.

OSHA: Final Asbestos Rules¹⁴

In the August 10, 1994 Federal Register, OSHA published final regulations to protect workers from exposure to asbestos. The rules, which cover four million workers and are estimated to cost \$361.2 million annually, went into effect on October 11, 1994. This OSHA rule applies to railroad operating employees.

At a press conference at OSHA headquarters, Assistant Secretary of Labor (OSHA), Joseph A. Dear said the rules will ensure effective long-term management of asbestos. OSHA has reduced the permissible exposure limit (PEL) from 0.2 fibers per cubic centimeter of air as an 8-hour time-weighted average to 0.1 fibers per cubic centimeter.

Asbestos in the Locomotive Cab

When steam generators were used on locomotives in passenger service, asbestos cement was used to insulate the heater coils to prevent loss of heat and contain the fire. Whenever the steam generator was disassembled and the coils had to be removed, the asbestos cement was broken up and removed, releasing asbestos particles which could be inhaled into the lungs. This source of asbestos was eliminated in the 1970's, when the head end power system was developed for the heating of passenger trains with electricity.

GE and EMD, the two primary manufacturers of current locomotives, made the following statements regarding asbestos in their locomotives:

- o GE¹⁵ stated that asbestos has not been permitted in any facet of their locomotive production since October 1979. In addition, GE stated that there is no record of asbestos ever being used in the cab environment of its

¹⁴ Occupational Hazards, Sept 1994, OSHA: Final Asbestos Rule Covers 4 Million Workers

¹⁵ Mr. R. Shults, Manager-Product & Environment Impact, General Electric Company (GE)

locomotives. Further, GE informed each of their outside suppliers in mid-1987 that all sub-assemblies provided for the production of locomotives must be free of asbestos.

- o EMD¹⁶ stated that of their 12 specifications for sound and thermal insulation applications, only one contained asbestos as a filler with a resin bonded fiberglass and only fiberglass was used as a loose insulating material. An EMD service bulletin was issued on April 6, 1984, prohibiting the use of asbestos for any purpose in locomotive construction. This restriction also is applied to outside contractors supplying sub-assemblies for the production of locomotives. In the 1970's, EMD began to curtail the use of asbestos in locomotive construction depending upon the location. EMD had identified 60 pages of part numbers which contained asbestos in some form in previous locomotive construction; however, these parts have been discontinued.

Conclusions

FRA has reviewed literature outlining the known health and safety effects of asbestos exposure, and contacted representatives from both primary locomotive manufacturers regarding the present and past use of asbestos in the construction of locomotives. While previous locomotive design incorporated the use of asbestos, and older locomotives remaining in service may still contain limited amounts of asbestos, there is no evidence that the presence of asbestos poses a problem to humans or the environment. The use of asbestos in locomotive production was terminated many years ago, and both primary manufacturers currently have policy statements prohibiting the use of asbestos in locomotive construction. Based on the above, FRA does not feel that further action with respect to the presence of asbestos in locomotive cabs is warranted at this time.

¹⁶ Mr. Widdman, Electro Motive Division (EMD)

No Action

FRA recommends no action be taken on the issue of asbestos in locomotives, except to the extent any new information requires that the issue be reopened. FRA found that friable asbestos has not been used as a material in the construction of locomotives for ten years or more. Locomotive builders are careful to avoid the use of asbestos in new and rebuilt locomotives. Asbestos remaining in older units is believed to be encapsulated in individual components or systems. FRA could find no evidence of asbestos being a health problem for crews of older locomotives.